

REPORT D'C

AD-A240 081

Form Approved

OMB No. 0704-0188

2

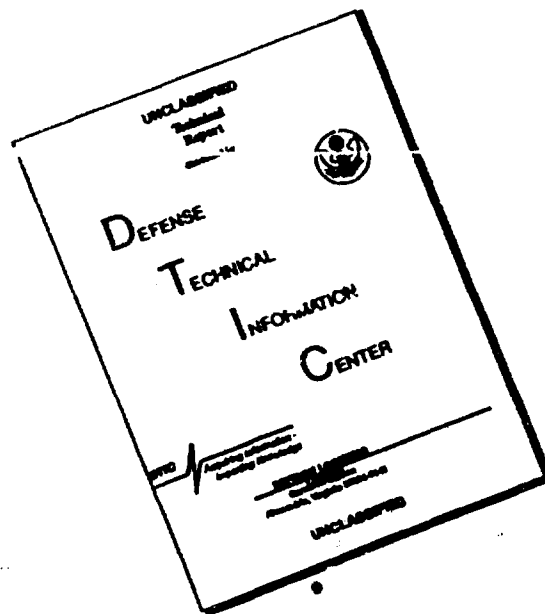
1. Instructions published for this section require that you fill in the data needed, and that you provide information, including suggestions for improvement, by 12/04/91. Washington, DC 20503



2. Reviewing this form as part of existing data sources regarding this burden estimate or any other aspect of this report, information operations and reports, 12/04/91. Jefferson Project (0704-0188) Washington, DC 20503

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE 08/06/91	3. REPORT TYPE AND DATES COVERED POP Test (06/91)
4. TITLE AND SUBTITLE Performance Oriented Packaging Testing of Container, Shipping and Storage, Mk 3 Mods 0, 1, 2, 3 for Packing Group II Solid Hazardous Materials		5. FUNDING NUMBERS	
6. AUTHOR(S)  James M. Dwyer		8. PERFORMING ORGANIZATION REPORT NUMBER  DODPOPHM/USA/DOD/ NADTR91017	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)  Naval Weapons Station Earle Test and Evaluation Division (Code 403) Colts Neck, NJ 07722-5000		10. SPONSORING / MONITORING AGENCY REPORT NUMBER  Same as above	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)  Naval Weapons Support Center (Code PM-4) Crane, IN 47522-5000			
11. SUPPLEMENTARY NOTES  N/A			
12a. DISTRIBUTION / AVAILABILITY STATEMENT		12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words)  Qualification tests were performed to determine whether the in-service Mk 3 Mod 0 Shipping and Storage Container could be utilized to contain properly dunnaged solid type hazardous materials weighing up to a gross weight of 48.5 kg (107 pounds). The tests were conducted in accordance with Performance Oriented Packaging (POP) requirements specified by the United Nations Recommendations on the Transportation of Dangerous Goods and the Department of Transportation's Title 49 CFR and the Final Rulings published in the Federal Register, Vol. 55 on 21 Dec 90. The container has conformed to the POP performance requirements; i.e., the container successfully retained its contents throughout the specified tests.  In addition, due to their similarities in size and weight, this test is considered representative of qualification testing for the Mk 3 Mods 1, 2, 3 Shipping and Storage Container as per the variation in the Federal Register (21 Feb 91) and page 52724, para 178.601h of the Final Rulings specified in the Department of Transportation's Performance Oriented Packaging Standards in the Federal Register, Vol. 55.			
14. SUBJECT TERMS  POP Test of Mk 3 Mods 0, 1, 2, 3 Shipping and Storage Container		15. NUMBER OF PAGES 6	
		16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT  UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE  UL	19. SECURITY CLASSIFICATION OF ABSTRACT  UL	20. LIMITATION OF ABSTRACT  UL

# DISCLAIMER NOTICE



THIS DOCUMENT IS BEST  
QUALITY AVAILABLE. THE COPY  
FURNISHED TO DTIC CONTAINED  
A SIGNIFICANT NUMBER OF  
PAGES WHICH DO NOT  
REPRODUCE LEGIBLY.

---

DODPOPHM/USA/DOD/NADTR91017

PERFORMANCE ORIENTED PACKAGING TESTING  
OF  
CONTAINER, SHIPPING AND STORAGE, MK 3 MODS 0, 1, 2, 3  
FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS

Author:  
James M. Dwyer  
Mechanical Engineering Technician



Performing Activity:  
Naval Weapons Station Earle  
Colts Neck, New Jersey 07722-5000

6 August 1991

FINAL

DISTRIBUTION UNLIMITED

Sponsoring Organization:  
Naval Weapons Support Center  
Code PM-4  
Crane, Indiana 47522-5000

1. TITLE	2. DATE
3. AUTHOR	4. ORIGINATOR
5. DISTRIBUTION	6. AVAILABILITY
7. SPECIAL	8. OTHER

A-1

91-07437



---

91 8 09 027

## **INTRODUCTION**

The Mk 3 Mod 0 Shipping and Storage Container tested, contained a simulated load of 43.9 kg (97 pounds) of sand representing the worst case of loading. Overall weight of the container was 48.5 kg (107 pounds). This Performance Oriented Packaging (POP) test was performed to ascertain whether this standard container (Packing Group II) would meet the requirements as specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9. A base level vibration test was also conducted in accordance with the final rulings specified in the Department of Transportation's Performance Oriented Packaging Standards in the Federal Register Volume 55. Due to unavailability, the number of containers used was less than the number required by the UN recommendation. This has been approved by the Under Secretary of Defense, Memorandum for the Joint Logistics Commanders dated 22 February 1990.

The objectives of these tests were to minimize the risk of personnel or environmental exposure to the hazards associated with the contents in the advent of a transportation or handling accident.

In addition, due to their similarities in size and weight, this test is considered representative of qualification testing for the Mk 3 Mods 1, 2, 3 Shipping and Storage Container as per the variation in the Federal Register (21 February 1991) and page 52724, paragraph 178.601h of the Final Rulings specified in the Department of Transportation's Performance Oriented Packaging Standards in the Federal Register, Volume 55.

## **TESTS PERFORMED**

### **1. Base Level Vibration Test**

This test was performed in accordance with paragraph 178.608 of the Performance Oriented Packaging Standards, Final Ruling, published in the Federal Register, Vol. 55, No. 246, December 21, 1990. Three sample containers were placed on the repetitive shock platform. The containers were restrained during vibration in all but the vertical direction. The frequency of the platform was increased until the container left the platform 1/16 of an inch at some instant during each cycle. Test time was 1 hour at a frequency of 3.5 Hz.

### **2. Stacking Test**

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.6. Two containers were used for this test. Each container was subjected to a force applied to its top surface equivalent to the total weight of identical packages stacked to a height of 3 meters (10 feet) (including the test sample). A weight of 856 pounds was stacked on each sample container. The test was performed for 24 hours. After the allowed time, the weight was removed and the containers examined.

### **3. Drop Test**

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.3. Five containers were used throughout the test. Five drops were performed from a height of 1.2 meters (4 feet), impacting the following surfaces:

- a. Flat bottom
- b. Flat top
- c. Flat on long side
- d. Flat on short side
- e. One corner

All tests were performed at an ambient temperature of  $+70 \pm 20$  °F.

### **PASS/FAIL (UN CRITERIA)**

#### **1. Base Level Vibration Test (HM-181 CRITERIA)**

The criteria for passing the base level vibration test is outlined in paragraph 178.608 of the Title 49 CFR Final Ruling and states the following: "immediately following the period of vibration, each package shall be removed from the platform, turned on its side and observed for any evidence of leakage. Rupture or leakage from any of the packages constitutes failure of the test."

#### **2. Stacking Test (UN CRITERIA)**

The criteria for passing the drop test is outlined in paragraph 9.7.6.3 of ST/SG/AC.10/1 and states the following: "... no test sample should leak. No test sample should show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages."

#### **3. Drop Test (UN CRITERIA)**

The criteria for passing the drop test is outlined in paragraph 9.7.3.5 of ST/SG/AC.10/1 and states the following: "Where a packaging for solids undergoes a drop test and its upper face strikes the target, the test sample passes the test if the entire contents are retained by an inner packaging or inner receptacle; e.g., a plastic bag, even if the closure is no longer sift-proof. A slight discharge from the closure(s) upon impact should not be considered to be a failure of the packaging provided that no further leakage occurs."

## **TEST RESULTS**

### **1. Base Level Vibration Test**

Satisfactory.

### **2. Stacking Test**

Satisfactory.

### **3. Drop Test**

Satisfactory.

## **DISCUSSION**

### **1. Base Level Vibration Test**

Immediately after the vibration test was completed, each container was removed from the platform, turned on its side and observed for any evidence of leakage. There was no leakage to the containers as a result of this test.

### **2. Stacking Test**

Each container was visibly checked after the 24-hour period was over. There was no leakage, distortion, or deterioration to any of the containers as a result of this test.

### **3. Drop Test**

After each drop, the containers were inspected for any damage which would be a cause for rejection. Final inspection indicated damage was minimal with only minor denting noted. The containers remained intact and functional upon completion of the tests.

## **REFERENCE MATERIAL**

A. United Nation's "Recommendation on the Transportation of Dangerous Goods." ST/SG/AC.10/1. Revision 6

B. Title 49 CFR 107, et al., Performance Oriented Packaging Standard; Changes to Classification, Hazard Communication, Packaging and Handling Requirements Based on UN Standards and Agency Initiative: Final Rule, Federal Register, Vol. 55, No. 246 of December 21, 1990.

## **DISTRIBUTION LIST**

Defense Technical Information Center (2 copies)

ATTN: DTIC/FDA

Bldg. 5, Cameron Station

Alexandria, VA 22304-6145

Headquarters, Military Traffic Management Command (2 copies)

ATTN: MT-SS, James Gibson

5611 Columbia Pike

Falls Church, VA 22041-5050

# TEST DATA SHEET

<b>DATA SHEET:</b>	
<b>Container:</b> Mk 3 Mods 0, 1, 2, 3 Shipping and Storage Container	
<b>Type:</b> 4A1	<b>Container P/N or NSN:</b> NSN 1305-01-003-2461
<b>Specification Number:</b> Drawing 328874	<b>Material:</b> Steel
<b>Gross Weight:</b> 48.5 kg (107 pounds)	<b>Dimensions:</b> 18.24" L x 9.00" W x 12.89" H
<b>Closure (Method/Type):</b> Catch Clamping	<b>Tare Weight:</b> 6.8 kg (15 pounds)
<b>Additional Description:</b>  Also as part of test, 92 pounds of sand was used.	
<b>PRODUCT:</b> See table	
<b>Name:</b> See table	<b>NSN(s):</b> See table
<b>United Nations Number:</b> See table	
<b>United Nations Packing Group:</b> II	
<b>Physical State (Solid, Liquid, or Gas):</b> Solid	
<b>Vapor Pressure (Liquids Only):</b> N/A <b>At 50 °C:</b> N/A <b>At 55 °C:</b> N/A	
<b>Consistency/Viscosity:</b> N/A	<b>Density/Specific Gravity:</b> N/A
<b>Amount Per Container:</b> See table	<b>Flash Point:</b> N/A
<b>Net Weight:</b> See table	
<b>TEST PRODUCT:</b>	
<b>Name:</b> Sand	<b>Physical State:</b> Solid
<b>Consistency:</b> N/A	
<b>Density/Specific Gravity:</b> N/A	
<b>Test Pressure (Liquids Only):</b> N/A	
<b>Amount Per Container:</b> N/A	<b>Net Weight:</b> 41.7 kg (92 pounds)



TABLE 1  
Mk 3 Mod 1, 2, 3 Shipping and Storage Container

HALC	NSN	Type	Packing Drawing	UN Code	UN Number	#/ Cntr	Weight (lb)
B515	1310-00-678-9990	ct, 40mm Blank Saluting	328874 329484 329494 564203 564212	1.3C	0327	67	
A862	1305-01-003-2461	ct, 20mm Linked	328874 329494 564203 564212	1.2E	0321	97	
	1305-00-1-003-2461	ct, 20mm Linked	328874 329494 564203 564212	1.4C	0339	97	

**MK 3 MODS 0, 1, 2, 3**  
**SHIPPING AND STORAGE CONTAINER**  
**POP MARKING**

**UN 4A1/Y48/S/\*\*/USA/DOD/NAD**

**\*\* YEAR LAST PACKED OR MANUFACTURED**